



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
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**Decision Rationale
Total Maximum Daily Loads
For pH
In Washington Ship Channel**

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Date: _____



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**Decision Rationale
District of Columbia
Total Maximum Daily Loads
Tidal Basin and Washington Ship Channel
For pH
December 15, 2004**

I. Introduction

The Clean Water Act (CWA) requires that Total Maximum Daily Loads (TMDLs) be developed for those water bodies that will not attain water quality standards after application of technology-based and other required controls. A TMDL sets the quantity of a pollutant that may be introduced into a waterbody without exceeding the applicable water quality standard. EPA's regulations define a TMDL as the sum of the wasteload allocations (WLAs) assigned to point sources, the load allocations (LAs) assigned to nonpoint sources and natural background, and a margin of safety.

This document sets forth the United States Environmental Protection Agency's (EPA) rationale for approving the TMDLs for pH in the Washington Ship Channel. This TMDL was established to address impairment of water quality as identified in the District of Columbia's (DC) 1998 Section 303(d) list of impaired waters. The DC Department of Health, Environmental Health Administration, Bureau of Environmental Quality, Water Quality Division, submitted the *Final Total Maximum Daily Load for pH in Washington Ship Channel* dated December 2004 (TMDL Report) to EPA for final review which was received by EPA on December 10, 2004.

Based on this review, EPA determined that the following eight regulatory requirements have been met:

1. The TMDLs are designed to implement the applicable water quality standards,
2. The TMDLs include a total allowable load as well as individual waste load allocations and load allocations,
3. The TMDLs consider the impacts of background pollutant contributions,
4. The TMDLs consider critical environmental conditions,
5. The TMDLs consider seasonal environmental variations,
6. The TMDLs include a margin of safety,
7. There is reasonable assurance that the proposed TMDLs can be met, and
8. The TMDLs have been subject to public participation.

II. Summary

Table 1 presents the 1998 Section 303(d) listing information for the water quality-limited Washington Ship Channel in effect at the time the consent decree was filed.

Table 1 - Section 303(d) Listing Information

1998 Section 303(d) List					
Segment No.	Waterbody	Pollutants of Concern	Priority	Ranking	Action Needed
18.	Washington Ship Channel	Bacteria, organics, and pH	Low	18	Point and Nonpoint Source (NPS) pollution

The TMDL is a written plan and analysis established to ensure that a waterbody will attain and maintain water quality standards. The TMDL is a scientifically-based strategy which considers current and foreseeable conditions, the best available data, and accounts for uncertainty with the inclusion of a margin of safety value. TMDLs may be revised in order to address new water quality data, better understanding of natural processes, refined modeling assumptions or analysis and/or reallocation.

III. Background

Washington Ship Channel Watershed

The Potomac River watershed covers 14,679 square miles in four states and the District of Columbia. The river is more than 380 miles long from its start in West Virginia to Point Lookout on the Chesapeake Bay.

The Potomac River provides 75 percent of the metropolitan Washington drinking water and all of the District's drinking water. The river also receives discharges from wastewater treatment plants, including the District's Blue Plains Plant and treatment plants for Arlington and Alexandria located just upstream of the DC/MD line. There are no drinking water intakes downstream of the District.

The Washington Ship Channel is a man-made waterbody located east of the Potomac River and was built in the late 19th century by the Army Corps of Engineers. The Washington Ship Channel runs from Hains Point at the confluence of the Anacostia and Potomac Rivers to the Tidal Basin. Fifty-three percent of the Washington Ship Channel watershed is comprised of government, commercial, and residential development. Recreational grass and parklands are found along the southern bank of the Ship Channel.

Consent Decree

This pH TMDL was completed by the District to partially meet the fourth-year TMDL milestone commitments under the requirements of the 2000 TMDL lawsuit settlement of *Kingman Park Civic Association et al. v. EPA*, Civil Action No. 98-758 (D.D.C.), effective June 13, 2000, as modified March 25, 2003. Fourth-year milestones also include the development of fecal coliform bacteria TMDLs for C&O Canal and Oxon Run and various metals, organics, and bacteria TMDLs for Oxon Run, Washington Ship Channel, and Tidal Basin.

IV. Technical Approach

When models are used to develop TMDLs, the model selection depends on many factors, including but not limited to, the complexity of the system being modeled, available data, and impact of the pollutant loading. The District DOH adopted a simple analytical approach using a combination of pH and chlorophyll *a* data from the Ship Channel, regression data from the 1983 Potomac River algal bloom study¹, and the Chesapeake Bay water quality model², to determine if the pH standards within the Potomac River Watershed is achieved under peak chlorophyll *a* concentration conditions (17.59 ug/l). Peak chlorophyll *a* concentrations were then used to determine pH in the Ship Channel using regression curve relationships. EPA finds that the District's approach is reasonable and appropriate as described in the following sections.

V. Discussions of Regulatory Requirements

EPA has determined that these TMDLs are consistent with statutory and regulatory requirements and EPA policy and guidance. EPA's rationale for approval is set forth according to the regulatory requirements listed below.

The TMDL is the sum of the individual waste load allocations (WLAs) for point sources and the load allocations (LAs) for nonpoint sources and natural background and must include a margin of safety (MOS). The TMDL is commonly expressed as:

$$\text{TMDL} = \sum \text{WLAs} + \sum \text{LAs} + \text{MOS}$$

where

WLA = waste load allocation
LA = load allocation
MOS = margin of safety

¹Thomann, R., et al. 1985. The 1983 Algal Bloom in the Potomac Estuary, Washington, DC

²USEPA. 2003. Setting and Allocating the Chesapeake Bay Basin Nutrient and Sediment Loads - The Collaborative Process, Technical Tools and Innovative Approaches. EPA903-R-03-007, Chesapeake Bay Program Office, Annapolis, Maryland.

1. The TMDLs are designed to implement the applicable water quality standards.

The TMDL Report states that the Washington Ship Channel is on the District's 1998 Section 303(d) list of impaired waters for pH because the District's ambient monitoring program disclosed exceedances of the water quality standards.

In the TMDL Report, the District lists the Washington Ship Channel's beneficial water uses as well as the general and specific water quality criteria designed to protect those uses. The designated uses for the Washington Ship Channel are:

- A. Primary contact recreation,
- B. Secondary contact recreation and aesthetic enjoyment,
- C. Protection and propagation of fish, shellfish and wildlife,
- D. Protection of human health related to consumption of fish and shellfish, and
- E. Navigation.

Table 2 - Water Quality Standards

Constituent		Criteria For Classes		
		A	B	C
pH	Greater than and Less Than	6.0 8.5	6.0 8.5	6.0 8.5

*49 D.C. REG. 3012; and 49 D.C. REG.4854

The TMDL report specifically identifies that pH values exceeding 8.5 violate the water quality criteria. Based on EPA's review of the TMDL report, the method of analysis used by the District indicates that water quality standards are being met in the Washington Ship Channel.

2. The TMDLs include a total allowable load as well as individual waste load allocations and load allocations.

The TMDL report divides storm water discharges into the following categories: separate stormwater, direct runoff, and direct deposit. The November 2002 EPA guidance memorandum clarifies existing EPA regulatory requirements for establishing wasteload allocations (WLAs) for NPDES storm water discharges in TMDLs approved or established by EPA.³ Therefore, this document identifies WLAs for storm water discharges.

The key points established in the memorandum are:

³Memorandum *Establishing Total Maximum Daily Load (TMDL) Wasteload Allocations (WLAs) for Storm Water Sources and NPDES Permit Requirements Based on Those WLAs*, from Robert H. Wayland, III, Director, Office of Wetlands, Oceans and Watersheds, and James A. Hanlon, Director, Office of Wastewater Management, to Water Division Directors, Regions 1 - 10, dated November 22, 2002.

- NPDES-regulated storm water discharges must be addressed by the wasteload allocation component of a TMDL.
- NPDES-regulated storm water discharges may not be addressed by the load allocation (LA) component of a TMDL.
- Storm water discharges from sources that are not currently subject to NPDES regulation may be addressed by the load allocation component of a TMDL.
- It may be reasonable to express allocations for NPDES-regulated storm water discharges from multiple point sources as a single categorical wasteload allocation when data and information are insufficient to assign each source or outfall individual WLAs.
- The wasteload allocations for NPDES-regulated municipal storm water discharge effluent limits should be expressed as best management practices.

The November 2002 memorandum recognizes that WLA/LA allocations may be fairly rudimentary because of data limitations. The District of Columbia divided the Washington Ship Channel TMDL into categories based on separate storm sewers (WLA) and upstream loads plus direct runoff (LA). The specific waste load and load allocations for the Washington Ship Channel are found in Table 3 - Phosphorous Allocations and Table 4 - pH TMDL Summary, below and indicate zero percent reductions for the District. The analytical results demonstrate that there is no violation of the water quality pH standard under the existing loads. However, ambient water quality modeling will assist in verifying analytical outcomes.

EPA finds the Districts reduction and allocation strategy acceptable.

Table 3 - Phosphorus Allocations (pounds per average year)

Sources	Existing Load	TMDL/Future Allocated Load	% Reduction
Upstream	3,246,530	2,323,964	28.42
Direct Runoff (DC)	165	408	0%
Storm Water (DC)	394	977	0

Table 4 - pH TMDL Summary (pounds phosphorus per average year)

Existing Load	TMDL	WLA	LA
3,247,089	2,325,349	977	2,324,372

3. The TMDLs consider the impacts of background pollutant contributions.

The Washington Ship Channel's background pollutant loads are made up from direct runoff inputs originating upstream in Maryland. EPA finds this acceptable and consistent with previously established TMDLs.

4. The TMDLs consider critical environmental conditions.

The TMDL Report considers critical environmental conditions in the Washington Ship Channel via the Chesapeake Bay water quality model, which was run for weather conditions ranging from 1985 to 1994. Within that time 1988, 1989, and 1990 represent average flow, a wetter than average year, and a drier than average year.

At the Ronald Reagan National Airport, the average annual rainfall for the period of record, 1949 to 1998, is 38.95 inches.⁴ Yearly totals vary, from 26.94 inches in 1965 to 51.97 inches in 1972. Individual events, often hurricanes, can be significant. Hurricane Agnes in 1972 delivered approximately 10 inches of rain in the Washington, DC area. The District selected 1988 to 1990 as their representative rainfall years as shown:

Table 4 - Rainfall

Year	Annual Rainfall (inches)	Representing
1988	31.74	10 percentile, dry year
1989	50.32	90 percentile, wet year
1990	40.84	median, approx. 38 percentile

(LTCP-3-2, September 1999)

EPA finds the District's approach reasonable and consistent with previously established TMDLs.

5. The TMDLs consider seasonal environmental variations.

The TMDL Report considers seasonal variations by using watershed modeling data for nine years. EPA finds the District's approach reasonable and consistent with previously established TMDLs.

6. The TMDLs include a margin of safety.

The Clean Water Act and federal regulations require TMDLs to include a margin of safety (MOS) to take into account any lack of knowledge concerning the relationship between effluent limitations and water quality. EPA guidance suggest two approaches to satisfy the MOS requirement. First, it can be met implicitly by using conservative model assumptions to develop the allocations. Alternately, it can be met explicitly by allocating a portion of the allowable load to the MOS.

The District has chosen to use an implicit margin of safety given the conservative assumptions found in the Chesapeake Bay water quality model and in the TMDL analysis. EPA finds the District's approach reasonable.

⁴Study Memorandum LTCP-3-2: Rainfall Conditions, Draft, September 1999.

7. There is reasonable assurance that the proposed TMDLs can be met.

Maryland, Virginia, Pennsylvania, and West Virginia tributary strategies in conjunction with the controls advocated by the Chesapeake Bay Agreement provide reasonable assurance that the upstream load reductions will be met.

8. The TMDLs have been subject to public participation.

DC public noticed an October 2004 version of this TMDL on October 29, 2004, with the comment period closing on November 29, 2004. The TMDL report was placed in the Martin Luther King Jr. Library and a public notice was published in the D.C. Register. In addition, EPA requested the District to use their e-mail list for the TMDL meetings to notify the interested parties of public comment period extensions. EPA believes all interested parties have had adequate time to comment on these TMDLs.

Comments were received from Earthjustice Legal Defense Fund. As part of DC's TMDL submittal, a response to comments document was submitted to EPA via e-mail.